

ISUZU EXHIBITION OVERVIEW  
FOR THE 34th TOKYO MOTOR SHOW - COMMERCIAL VEHICLES-

Isuzu Motors Limited is exhibiting a total of 12 vehicles at the 34th Tokyo Motor Show, including seven reference exhibits based on marketed cars as well as design concept models offering a look at the future of commercial vehicles. From Wednesday, November 1 to Saturday, November 4 at Makuhari Messe, Isuzu is also exhibiting 10 direct-injection diesel engines featuring excellent fuel economy and low emissions, the Diesel Particulate Filter (DPF) system, NOx catalysts and a next-generation operational system for the future of logistics.

Isuzu recognizes its responsibility as a world-class commercial vehicle and diesel engine maker, and sees the environment, safety and realization of highly efficient transportation systems as important tasks. For this Motor Show, Isuzu introduces value-added products that represent Isuzu's innovative solutions under the theme of "Our vision, our goal."

GOAL OF COMMERCIAL VEHICLE EXHIBITION

To present state-of-the-art environmental solutions and management efficiency measures based on Isuzu's proven achievements, reliability and original thinking.

- Full air-suspension vehicles that are on the cutting-edge of distribution.

**[GIGAMAX Cargo with full Air Suspension] [GIGAMAX Tractor with Full Air Suspension]**

- CNG(Compressed Natural Gas) trucks that offer clean emissions, low noise and powerful performance.

**[Elf CNG Dry Van][FORWARD CNG Refrigerated Van]**

- Route buses that take good care of both people and environment.

**[ERGA CNG Non-Step Route Bus]**

In total, 12 vehicles -- including marketed vehicles and reference exhibits based on marketed vehicles -- propose new uses for commercial vehicles. Also on display are design concept models of future delivery vehicles.

GOAL OF ENGINE AND TECHNOLOGY EXHIBITION

To highlight the original technologies of Isuzu as it pursues the goal of becoming the No. 1 maker of diesel engines and commercial vehicles in the world.

The exhibition lineup of diesel engines focuses on new technologies that reduce harmful substances in exhaust gases and especially carbon dioxide, which leads to global warming. These engines also offer such advantages as superior fuel economy and durability. In addition, a next-generation operational system and safety concepts utilizing state-of-the-art information technologies are exhibited.

EXHIBIT VEHICLES		
1	GIGAMAX Cargo with Full Air Suspension	Reference exhibition
2	GIGAMAX Tractor with Full Air Suspension	Reference exhibition
3	FORWARDMAX Short Cab	—
4	FORWARD CNG Refrigerated Van	Reference exhibition
5	Elf CNG Dry Van	—
6	Elf Refrigerated Delivery Van	Reference exhibition
7	Elf Low Bed 4WD Dump Truck	—
8	Elf UT Mobile Office	—
9	GALA 2000 GHD Sightseeing Bus	—
10	ERGA CNG Non-Step Route Bus	Reference exhibition
11	TFS Pickup Truck	Reference exhibition Export model
12	160	Reference exhibition Overseas manufacture model
13	Design Concept Models FL1/FL10 (1/5 Scale Model)	Concept models

ENGINE EXHIBITION		
1	6WF1-TC Diesel Engine for Heavy-Duty Trucks	
2	6WG1-TC Diesel Engine for Heavy-Duty Trucks	
3	6TE1-TC Diesel Engine for Heavy-Duty Trucks	Reference exhibition
4	10TD1 Diesel Engine for Heavy-Duty Trucks	
5	6HK1-TC Diesel Engine for Medium-Duty Trucks	
6	4HJ1 Diesel Engine for Light-Duty Trucks	

7	4JX1-TC Diesel Engine for SUVs	Reference exhibition
8	2.5-3.0L Class V6 Diesel Engine	
9	8GF1 Diesel Engine for Full-size Pickups	
10	4EE2-TC Diesel Engine for Passenger Vehicles	

TECHNOLOGY EXHIBITION		
1	DPF (Diesel Particulate Filter)	
2	Continuously Regenerating Diesel Particulate Trap	Panel exhibition
3	Nox Catalyst	Panel exhibition
4	One-Way Cooled EGR (Exhaust Gas Recirculation) system	Panel exhibition
5	Next-Generation Truck Operational System	Reference exhibition
6	ASV-2 Safety Concept Vehicle	Reference exhibition

## OUTLINE OF MAIN EXHIBITION

### OUTLINE OF EXHIBIT VEHICLES

4 Bag Air-Suspension Vehicle Series (MAX Series)

On display are three vehicles, including two reference exhibit vehicles and one based on the popular "4 Bag" full air-suspension GIGAMAX.

#### 1. GIGAMAX Cargo with Full Air-Suspension (Reference exhibition)

< Features >

- Full air suspension on both front and rear axles. Rear "4 bag" air suspension puts this vehicle at the forefront of efficient distribution.
- Independent height adjustment for front and rear increases ease of loading. The vehicle is also designed for use with swap bodies.
- Sensors monitor air pressure in the axle-support system. Load weight is measured electronically even while the vehicle is stopped.
- The 6WF1-TC diesel provides the power, torque and fuel economy for a wide range of applications.

#### 2. GIGAMAX Tractor with Full Air-Suspension (Reference exhibition)

< Features >

- Offering many of the same advantages of the GIGAMAX Cargo, this full air-suspension GIGAMAX Tractor has "2 bag" air suspension on the front axle. Full air suspension increases cab comfort by controlling trailer pitch and also prevents loads from shifting and being damaged.
- The high-roof cab presents a dignified appearance suited to leading carriers on arterial routes. The cabin interior is spacious and relaxing.
- The vehicle utilizes the powerful and fuel-efficient 6WG1-TC engine.

### 3. FORWARDMAX Short Cab

#### < Features >

- Reflecting GIGAMAX design, this vehicle also has "4 bag" air suspension on the rear axle, greatly reducing weight and increasing payload over existing "2 bag" air suspension with leaf springs. The exhibit vehicle is the highly efficient Short Cab model.
- By adopting improved "4 bag" air suspension on medium-duty trucks, vibration is reduced regardless of load weight and placement. The system prevents shipments from shifting and being damaged, and represents a great advance in the quality of transportation.

#### Elf Series

The Elf exemplifies product development strategies that accurately meet user needs. For 30 years in a row, the Elf has been the No. 1 light-duty truck in Japan based on low cab-forward 2-3 ton truck registration. Three vehicles, including one reference exhibit, are on display.

### 1. Elf Refrigerated Delivery Van (Reference exhibition)

#### < Features >

- A delivery vehicle for refrigerated cargo that takes urban environments and energy conservation into account. By electrically running the refrigeration unit while stopped, the temperature of shipments is precisely controlled to maintain quality.

### 2. Elf Low Bed 4WD Dump Truck

#### < Features >

- Significant improvements in performance and maneuverability on rough roads have been achieved by increasing the capabilities of the "viscous coupling tolerance torque on the viscous torque split" 4WD system. In addition, part-time 4WD improves fuel economy.
- The Idling Stop & Start system, which automatically stops the engine when the driver leaves the seat to handle deliveries, is a standard feature on this vehicle.
- Changes in engine and front axle layout result in a length of 3050mm for the cargo area, longest in its class.

- "Dual-mode manual transmission," an original Isuzu system for easy driving, allows clutch-free operation for when getting underway, changing gears and stopping. The Hill Start Aid system and ABS are standard features to improve comfort and safety.

### 3. Elf UT Mobile Office

#### < Features >

- A new, stylish business vehicle with a unique semi-cabover design. To accommodate diversification of the delivery business and the increasing number of women drivers, this vehicle focuses on fashion, simple operation, easy access and comfort.
- The cargo area is spacious and high enough to work in while standing up. This vehicle can be used for various purposes, including use as a recreational vehicle. The exhibit vehicle is the mobile office model.

### CNG (Compressed Natural Gas) Truck Series

CNG has been attracting attention as a alternative energy to petroleum. Two Isuzu CNG trucks offering clean emissions, low noise and plenty of power are on display, including a reference exhibit vehicle.

#### 1. FORWARD CNG Refrigerated Van (Reference exhibition)

##### < Features >

- A refrigerated van with the clean 6HA1 CNG engine, which produces zero black smoke. Air pollutants such as nitrogen oxides, carbon monoxide and hydrocarbons are greatly reduced. (Please refer to figures.)
- The low-noise engine makes the vehicle especially suitable for city deliveries in residential areas and can boost the images of both product and transportation companies.

#### 2. Elf CNG Van

##### < Features >

- A clean-emission CNG engine\* that produces zero black smoke is also used in this low-pollution Elf truck. The vehicle has gained the top share of CNG sales in Japan. (\* 4HF1 engine; compared to 1999 emission standards, this engine achieved large reductions in nitrogen oxides [95%], carbon monoxide [45%], hydrocarbons [95%] and black smoke [100%.])
- The first CNG light-duty truck to incorporated an electromagnetic retarder to improve control and safety.

### Bus Series

#### 1. GALA 2000 GHD Sightseeing Bus

##### < Features >

- Extensive safety features including a high-strength body meeting ECE rigidity standard R-66 for body rigidity and a lightweight permanent magnetic retarder.
- The 8TD1-S engine, with the highest power output among domestic sightseeing buses, makes the ride smooth and pleasant.
- A luxury salon car atmosphere is created by adopting European-style interior design and swivel seats.

## **2. ERGA CNG Non-Step Bus (Reference exhibition)**

< Features >

- By placing lightweight aluminum-lined fuel tanks on the roof, a "non-step" and flat floor is possible on this CNG bus, demonstrating Isuzu's concern for both people and the environment.
- Physically challenged persons can take advantage of an air-suspension "kneeling" feature of up to 70mm and an automatic ramp.
- The high-strength body of the ERGA also meets ECE standard R-66 for rigidity to improve safety.

Global Vehicle Series

## **1. TFS Pickup Trucks (Reference exhibition, export models)**

< Features >

- The "Mega-Kit" accessory package on the five-passenger 4WD Crew Cab strengthens the SUV image of this vehicle, which has proven so popular worldwide.
- In order to create new appeal, its exterior design is further refined while the interior offers enhanced quality and comfort.

## **2. 160 (Reference exhibit, overseas manufacture model)**

< Features >

- A multi-purpose vehicle that is just the right size for worldwide applications. This global car has various configurations according to the number of passengers and cargo volume. The first of this model -- "Panther," manufactured locally in Indonesia -- was launched in September.

FL1 / FL10 Design Concept Model

The limitless possibilities of commercial vehicles are clearly seen in these designs for future delivery vehicles, introduced at one-fifth of their actual size. The rear body design is based on the assumption that light-duty vehicles will connect main transportation routes through the rapid distribution of containerized cargo.

OVERVIEW OF EXHIBIT ENGINES AND ENGINE TECHNOLOGIES

## Diesel Engines

### 6WF1-TC Diesel Engine for Heavy-Duty Trucks

Power and good fuel economy are the strong points of this diesel engine for heavy-duty trucks. Advanced technologies such as the HD-TICS type high-pressure fuel-injection system result in high torque at low rpm and excellent start-up power. Fuel economy is also excellent due to its intercooled turbo charger. This is an all-round engine that meets a wide range of needs and is used on Isuzu's heavy-duty GIGA truck series. In addition, the precise control over fuel injection due to TICS and the one-way cooled EGR system help to reduce harmful substances in exhaust gases, including particulate matter, black smoke and NOx.

6WF1-TC Diesel Engine	
Displacement	14,256 cc
Max. Output	272 kW (370PS)/1,750rpm
Max. Torque	1,184 N * m(185kg-m)/1,000rpm
Features	*Direct injection
	*HD-TICS type high-pressure fuel injection
	*OHC 24-valve
	*One-way cooled EGR system
Vehicle on Board	GIGA Cargo/Dump/Tractor series

### 6WG1-TC Diesel Engine for Heavy-Duty Trucks

A diesel engine for heavy-duty trucks that offers superior power and torque. By adopting electronic common rail high-pressure fuel injection and the one-way cooled EGR system, it realizes plenty of power and clean emissions. This engine is used on Isuzu's heavy-duty GIGA truck series.

6WG1-TC Diesel Engine	
Displacement	15,681cc
Max, Output	382kW (520ps)/1,800rpm
Max. Torque	2,254N * m (230kg-m)/1,300rpm
Features	*Direct injection
	*Electronic common rail high-pressure fuel injection system
	*OHC 24-valve

Vehicle on Board	*One-way cooled EGR system GIGA Tractor Series
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#### 6TE1 Diesel Engine for Heavy-Duty Trucks (Reference exhibition)

A compact V6 direct-injection engine for heavy-duty trucks. It produces consistent high torque at low rpm and it is the optimum engine for flat beds and dump trucks. It is scheduled for use on next-generation GIGA trucks.

6TE1 Diesel Engine	
Features	*Direct injection
	*OHV 24-valve
Vehicle on Board	GIGA Series

#### 10TD1 Diesel Engine for Heavy-Duty Trucks

A OHV V10 engine with 40 valves; at 441kW (600PS), it boasts the highest output in its class in Japan. It provides the power for heavy hauling and is used on Isuzu's GIGA Tractor.

10TD1 Diesel Engine	
Displacement	30,390cc
Max, Output	441kW(600PS)/2,100rpm
Max. Torque	2,059N * m(210kg-m)/1,300rpm
Features	*Direct injection
	*OHV40-valve
	*ERG system
Vehicle on Board	GIGA Tractor

#### 6HK1-TC Diesel Engine for Medium-Duty Trucks

A intercooled turbo engine for medium-duty trucks. Technologies such as electronic common rail high-pressure fuel injection and 4-valve-per-cylinder design result in combustion efficiency and good fuel economy. Isuzu's medium-duty FORWARD trucks and the ERGA large route bus use this engine.

6HK1-TC Diesel Engine	
Displacement	7,790cc

Max, Output	206kW(280PS)/2,700rpm
Max. Torque	804N * m(82kg-m)/1,400rpm
Features	*Direct Injection
	*Electronic common rail high-pressure fuel injection system
	*OHC 24-valve
Vehicle on Board	FORWARD Series, ERGA Series

#### 4HJ1 Diesel Engine for Light-Duty Trucks

A diesel engine for light-duty trucks that utilizes full electronic control for the new high-pressure fuel-injection pump and EGR system, realizing clean emissions and high output. It is used on the Elf light-duty truck.

4HJ1 Diesel Engine	
Displacement	4,958cc
Max, Output	114kW(155PS)/3,100rpm
Max. Torque	363N * m(37kg-m)/1500rpm
Features	*Direct injection
	*Electronic-controlled high-pressure fuel injection pump
	*OHC 16-valve
	*EGR system
Vehicle on Board	Elf Series

#### 4JX1-TC Diesel Engine for SUVs

This inline four-cylinder diesel is a powerful performer due to its intercooled turbo charger and 16-valve DOHC design. Output reaches 118kW (160PS) while torque hits 334Nm (34.0 kg-m).

In particular, high torque is realized at only 2000 rpm, making for exceptional drivability.

The common rail high-pressure fuel injection system contributes to both power and fuel efficiency, boosting fuel economy 60% over existing Isuzu vehicles equipped with a gasoline engine of the same class (6VD1 engine, running in fixed position at 60km/h). When compared to an Isuzu diesel engine in the same class, this engine reduces NOx emissions 35% and PM 60% (compared to 4JG2-TC engine, 10-15 mode).

4JX1-TC Diesel Engine	
Displacement	2,999cc

Max, Output	118kW(160PS)/3,900rpm
Max. Torque	333N * m(34.0kg-m)/2,000rpm
Features	*Direct injection
	*Electronic common rail high-pressure fuel injection system(HEUI Type)
	*DOHC 16-valve
	*Improved fuel economy / low noise
Vehicle on Board	Bighorn(Trooper)

### 2.5-3.0L Class Light-Duty V6 Diesel Engine

A direct-injection diesel engine developed for next-generation passenger cars and SUVs. Its lightweight and compact aluminum construction allows use on FWD vehicles. With common rail high-pressure fuel injection and 24-valve DOHC, this engine achieves much better fuel economy, clean emissions and superior overall performance. In addition, V-type 6-cylinder design, pilot injection and precise fuel control make this an extremely quiet and low-vibration engine.

2.5-3.0L class V6 Diesel Engine (Reference exhibition)	
Features	*Direct injection
	*Electronic common rail high-pressure fuel injection system
	*DOHC 24-valve
	*Lightweight, compact aluminum engine that realizes improved fuel economy and lower emission
	*Quiet engine that produces little noise and vibration thanks to pilot injection and precise fuel control system
Vehicle on Board	Luxury-class passenger vehicles and SUVs

### 8GF1 Diesel Engine for Full-size Pickups

A direct-injection diesel engine developed for better overall performance in next-generation SUVs.

Despite its large displacement, the aluminum head and intercooled turbo charger result in a compact and lightweight engine.

The highly efficient 32-valve system (four valves per cylinder) and common rail high-pressure fuel injection provide excellent fuel economy as well as superior output and torque. Low emissions make the engine easy on the environment.

Moreover, pilot injection and precise fuel control result in gasoline-engine levels of low noise and vibration. This engine

is manufactured at DMAX, Ltd., Isuzu's diesel engine plant in North America, and will be used on GM full-size pickup trucks (Chevrolet Silverado, GMC Sierra) this fall.

8GF1 Diesel Engine	
Displacement	6,599cc
Max, Output	224kW(300PS)/3,100rpm
Max. Torque	705N * m(72kg-m)/1,800rpm
Features	*Direct injection
	*Electronic common rail high-pressure fuel injection system
	*OHC 32-valve
Vehicle on Board	Chevrolet Silverado, GMC Sierra

#### 4EE2-TC Diesel Engine for Passenger Vehicles

An inline four-cylinder intercooled turbo diesel with 16-valve DOHC design that increases fuel economy 20% over existing Isuzu engines. This is due to the new high-pressure fuel injection pump (rotary system), which electronically controls injection amount and timing.

By adopting pilot injection and a two-step valve pressure nozzle, this engine is extremely quiet at idle and while accelerating. In addition, it meets strict EC 2000 emission standards.

The engine's overall performance is highly evaluated in Europe, where it is already in use on Astra from the Germany maker Adam Opel AG.

4EES-TC Diesel Engine	
Displacement	1,686cc
Max, Output	55kW(75PS)/4,400rpm
Max. Torque	165N * m(16.8kg-m)/1,800rpm
Features	*Direct injection
	*Electronic-controlled high-pressure fuel injection pump
	*DOHC 16-valve
Exhaust Gas	Meets EC2000 emission regulations
Production Factory	Isuzu Motors Polska sp z o.o.
Vehicle on Board	Opel Astra

### **1. DPF (Diesel Particulate Filter)**

Isuzu pioneered developed of the DPF system. By switching between two filters, particulate matter and black smoke can be incinerated in one filter while the other continues to trap pollutants. Heat-resistant and durable ceramic is used as the material for filters. Dense and rough, these filters are highly effective. In addition, the large surface area of the filter fibers traps even more PM and black smoke to clean up exhaust gases.

### **2. Continuously Regenerating Diesel Particulate Trap (Panel exhibition)**

This system changes the nitrogen monoxide in exhaust gas into nitrogen dioxide by means of an oxidation catalyst and constantly incinerates particulate matter collected in the filter. Product development continues. Currently, deterioration of the catalyst due to the high sulfur content of light oil has yet to be resolved. Reduction of sulfur in light oil is a future task.

### **3. NOx Catalyst (Panel exhibition)**

Much like the DPF system, this is another after-treatment to clean up diesel engine exhaust. The system changes NOx into harmless substances such as N<sub>2</sub> (nitrogen) and H<sub>2</sub>O (water).

For this year's Motor Show, Isuzu presents a panel exhibition of a NOx catalyst utilizing urea as the reducing agent. The NOx catalyst system owes its effectiveness to the ammonia contained in the urea solution that is injected into the exhaust.

### **4. One-Way Cooled EGR system (Panel exhibition)**

By mixing exhaust gas with intake air and controlling the amount of oxygen during combustion, the EGR (Exhaust Gas Recirculation) system greatly reduces NOx. A cooler and check valves are utilized in the one-way cooled EGR system to increase its efficiency by lowering combustion temperatures and preventing back flow of intake air, which can occur with turbo-charged engines.

### **1. Next-Generation Truck Operational Support System (Panel exhibition)**

This operational support system allows the constant exchange of information among vehicles, distributors, shippers and Isuzu via the Isuzu information center. It enhances overall logistic efficiency by using detailed vehicle information to support safety and economical operation. This system dynamically improves operational control and maintenance scheduling as well as responses to accidents, breakdowns and the condition of drivers.

### **2. ASV-2 Safety Concept Vehicle (Panel exhibition)**

An advanced safety vehicle that supports drivers and prevents accidents with state-of-the-art technologies, such as systems for monitoring driving operation, advanced front lighting, left-turn information, adaptive cruise control, head-on accident avoidance, vehicle dynamics control and a front "under-run" protection device.

